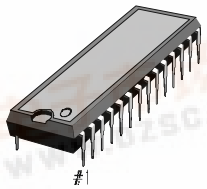
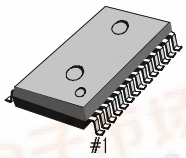
INTRODUCTION

The S1A0136A01 is a monolithic intergrated circuit designed for use in low voltage and low power applications. It has functions including dual audio pre-power amplifier, electronic volume controller and DC motor speed controller in a single chip. It is suitable for portable tape recorders headphone cassette tape recorders or radios that are battery-operated.

28–SDIP



28–SOP



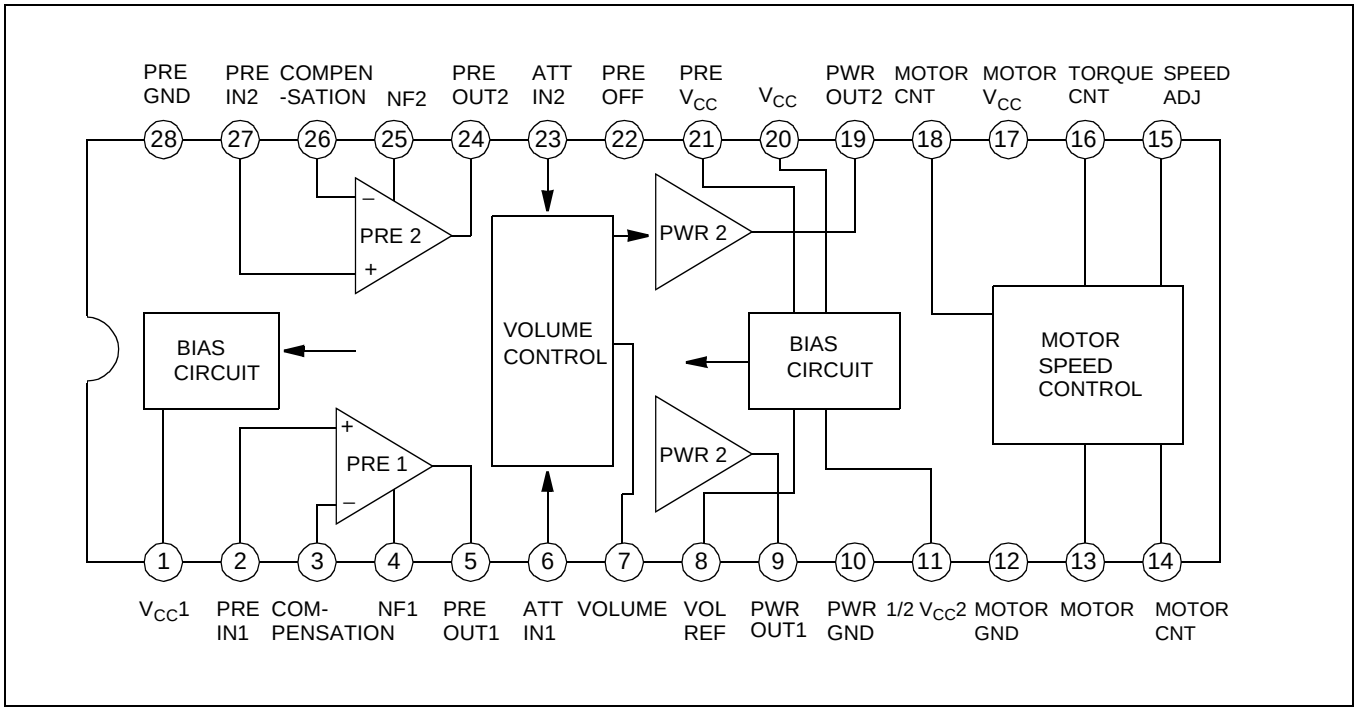
FEATURES

- Low current consumption in an operating voltage range
- Operating supply voltage range: Vcc = 2.1V – 5V
- Only a few components in composing a headphone cassette tape recorder
- Dual audio pre-power amplifier, electronic volume controller and DC motor speed controller in a single chip
- Reduced input and output coupling capacitors because of 1/2 Vcc AMP adoption on chip as AC GND

ORDERING INFORMATION

Device	Package	Operating Temperature
S1A0136A01-A0B0	28–SDIP	–20°C — + 65°C
S1A0136A01-S0B0	28–SOP	

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	7.5	V
Power Dissipation	P_O	450	mW
Operating Temperature	T_{OPR}	–20 — +70	°C
Storage Temperature	T_{STG}	– 40 — +125	°C

ELECTRICAL CHARACTERISTICS

(Ta = 25°C, V_{CC} = 3V, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Quiescent Circuit Current	I_{CCQ}	V_{CC} = 3V, V_I = 0, I_M = 0	–	18	25	mA

PRE AMPLIFIER SECTION

(V_{CC} = 3V, f = 1kHz, R_{L1} = 10kΩ, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Open Loop Voltage Gain	G_{VO}	V_O = –10dBm, R_L = ∞	–	70	–	dB
Closed Loop Voltage Gain	G_{VC1}	V_O = –10dBm	40	42	44	dB
Output Voltage	V_O	THD = 1%	0.45	0.6	–	V
Total Harmonic Distortion	THD	V_O = 0.2V	–	0.05	0.5	%
Output Noise Voltage	V_{NO1}	V_i = 0, R_g = 2.2kΩ, BPF(30 – 20kHz)	–	150	300	μV
Input Resistance	R_I	V_O = 10dBm	18	22	–	kΩ
Cross Talk	CT_1	R_G = 2.2kΩ, V_O = –10dBm	30	–	–	dB
Output Voltage In Pre OFF	$V_{O\ (OFF)}$	V_I = 100mV Pre OFF (pin 22) = V_{CC}	–	–	–50	dB

POWER AMPLIFIER SECTION

(Ta = 25°C, V_{CC} = 3V, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Closed Loop Voltage Gain	G_{VC2}	P_O = 5mW	26	28	30	dB
Voltage Gain Difference	ΔG_V	V_{CONT} = Max	–	0	3	dB
Output Power 1	P_{O1}	THD = 10%, R_L = 32Ω	20	28	–	mW
Output Power 2	P_{O2}	THD = 10%, R_L = 16Ω	30	–	–	mW
Total Harmonic Distortion	THD_2	P_O = 5mW	–	0.2	2.0	%
Pre+ Power Output Noise Voltage	V_{NO2I}	V_I = 0, R_G = 2.2kΩ, V_{CONT} = Max	–	6	10	mV
Output Noise Voltage	V_{NO3I}	R_G = 2.2 kΩ, V_{CONT} = Min	–	0.25	1.0	mV
Cross Talk	CT_2	R_o = 5mW	20	30	–	dB
Ripple Rejection Ratio	RR	V_{CC} = 3V, 100Hz, 100mVp-p	34	40	–	dB

ATTENUATOR SECTION

(Ta = 25°C, V_{CC} = 3V, f = 1kHz, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Maximum Input Voltage	$V_{I(MAX)}$	–	0.2	–	–	V
Maximum Attenuation	$V_{ATT(MAX)}$	V_{CONT} = Min	66	–	–	dB
Attenuation Error	$V_{ATT(ERR)}$	V_{CONT} = Max	–	0	–	dB
Input Impedance	Z_I	–	15	20	–	KΩ

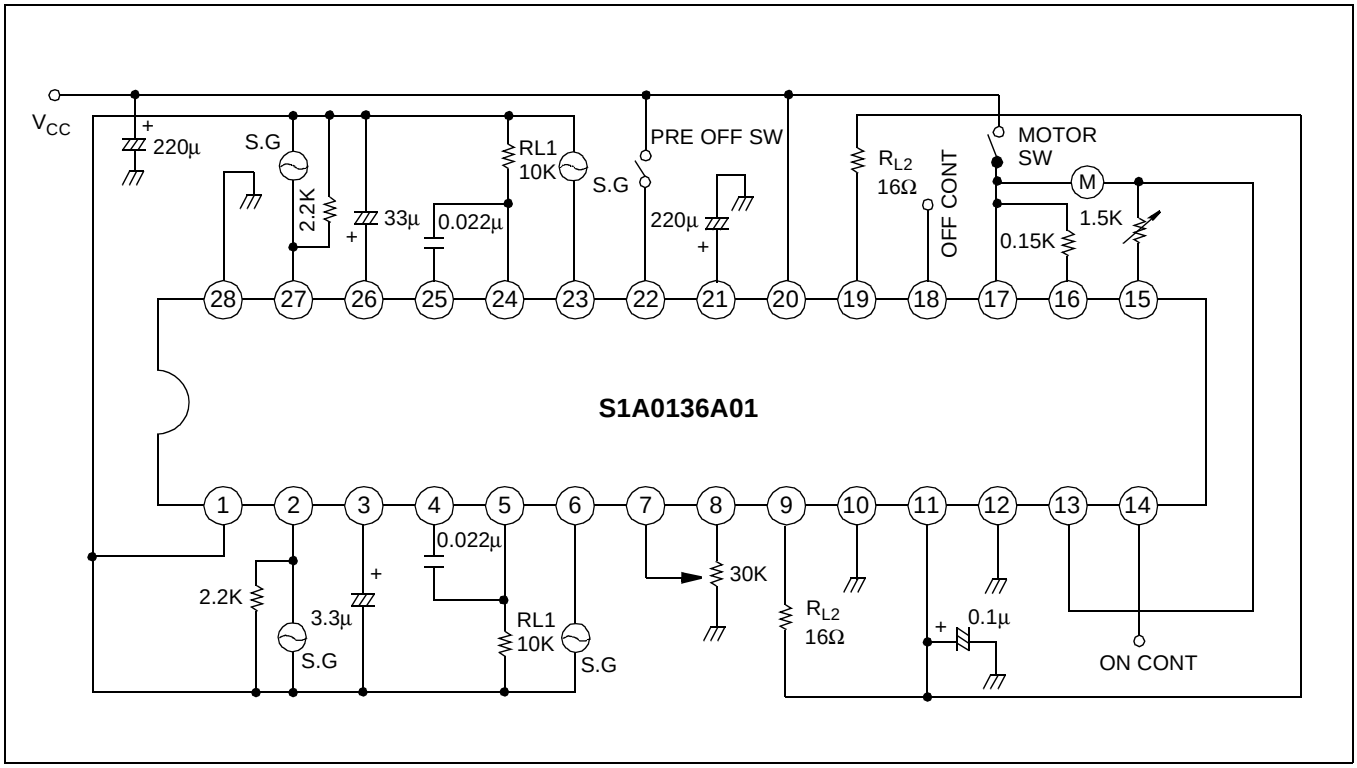
MOTOR SPEED CONTROLLER

(Ta = 25°C, V_{CC} = 3V, I_M = 100mA, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Circuit Current	I_{MC}	–	–	3.0	5.0	mA
Starting Current	I_{MS}	–	500	–	–	mA
Reference Voltage	V_{REF}	V(pin 15, 16)	0.72	0.80	0.87	V
Reference Voltage Regulation 1	ΔV_{REF1}	V_{CC} = 2.1 – 5.0 V	–	0.05	–	%/V
Reference Voltage Regulation 2	ΔV_{REF2}	I_M = 25 – 250 mA	–	0.01	–	%/mA
Reference Voltage Regulation 3	ΔV_{REF3}	Ta = -10 ~ 50 °C	–	0.01	–	%/°C
Current Coefficient	K	–	32	38	43	–
Current Coefficient Regulation 1	ΔK1	V_{CC} = 2.1 – 5.0 V	–	0.50	–	%/V
Current Coefficient Regulation 2	ΔK2	I_M = 25 – 250 mA	–	0.05	–	%/mA
Current Coefficient Regulation 3	ΔK3	Ta = –10 – 50 °C	–	0.02	–	%/°C
Saturation Voltage	V_{SAT}	I_M = 200mA, Pin14 = V_{CC}	–	–	0.6	V
Leakage Current	I_{LKG}	Pin 18 = V_{CC}	–	50	200	µV

* Voltage across Pin 13, 17

TEST CIRCUIT



APPLICATION CIRCUIT